ISMA* Technical Conference

Seville, Spain
20-24 November 1972

*In 1982, the name of the International Superphosphate Manufacturers' Associations (ISMA) was changed to International Fertilizer Industry Association (IFA).

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THE INTERNATIONAL TRANSPORT CODES AND THEIR IMPORTANCE TO THE FERTILIZER MANUFACTURER

By

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1. INTRODUCTION

The transport of dangerous cargoes has increased tremendously in recent decades. The number of international codes regulating such transport is also increasing, and the transport picture is becoming more and more complex. I was therefore asked to give a survey of the situation and especially of the place of ISMA/APEA in this picture. I am aware of the fact that many here are well informed on this subject and beg them to excuse me for repeating information already known, but ask them to remember that the information is for the benefit of the majority of the members who are less well-informed.

2. HAZARDS INVOLVED

In Appendix 1 you will find the different types of hazard from the various types of solid fertilizers. At this point, it is worth knowing that all the most common types of fertilizer are free from transport regulations except (IMCO):

Metal- (potassium-, calcium-, magnesium-) nitrates

Pure ammonium nitrate (later called AN)

Compounds liable to self-sustaining decomposition)

The information about the transport codes might be of interest anyhow, because it is not enough to know that a commodity is free - one should also know the conditions for this freedom and where the restrictions start.

The hazardous properties of AN have long been recognized. The compounds liable to self-sustaining decomposition on the other hand were not recognized as hazardous by any of the transport authorities until recently. At the beginning of the '60s some large decompositions took place. In 1961 we had the decompositions near Frankfurt (No 2 of unreported accidents in our scheme (Annex 2)) and in 1963 we had the decomposition in Vlaardingen (No 5 of unreported accidents). During a meeting of The Fertilizer Society on January 28th 1965, I predicted new rules

and urged producers to cooperate (1). When the "Sophocles" decomposition occurred less than one month later, the International Maritime Transport Organization (IMCO) had to act.

In this atmosphere ISMA and APEA started their joint Working Party early in 1966, establishing a great number of joint sub-committees. I shall not bore you with a survey of the work of all of them, but just mention two sides of the work. The drawing up of a code for safe practice in handling fertilizers and the establishment of an accident-reporting scheme. This latter has now been in use for 6 years and the accidents which occurred appear in Appendix 2. In studying the accidents which occurred in 1966 and later we find the following:

1966	12	accidents	in all,	3 unreported
1967	8	"	" " ,	5 "
1968	6	"	" " ,	1 "
1969	6	"	" " ,	1 "
1970	8	"	" " ,	0 "
1971	1	"	" " ,	0 "
1972	2	"	" " ,	0 "
Total	43	accidents in last 6 years		

If we can rely on the scheme and that the same proportion of the accidents are still being reported, we must assume that the number of accidents showed a definite increase in recent years.

The total number of accidents with solid fertilizers known in the whole reporting period is 56. If we break this number down into the different categories, we find the following:

15	accidents in	NPK-production
30	"	" NPK-storage (of these 19 in bulk)
8	"	" NPK-ship-transport (on rail and road: nil)
1	accident	" CAN-production
1	"	" AN-production
4	accidents	" AN-road-transport (on ship and and rail: nil)
Total	59 accidents	

From the above list we can find some interesting facts. In more than 90% of these accidents, compounds were involved and this is considerably more than their share of the N-market.

In accidents during the storing of compounds, about 63%, or nearly 2/3 of the accidents occurred during bulk storage.

The most interesting observation we can make from the above list is, however, that all transport accidents with compounds have taken place during ship-transport and not a single accident occurred with compounds on rail or road, and one because of impurities.

For AN, four road accidents have occurred, two of them during parking of the vehicle and one because of heat from a flat tyre, and one because of impurities.

During storing and transport 41 accidents have occurred with solid fertilizers. Here 3 persons were reported killed and 22 persons gassed and slightly injured. The ones killed were all involved in the "Sophocles" accident (Reporting scheme No A/18).

This accident was the first major self-sustaining decomposition that occurred during transport, and accordingly had a considerable influence on the subsequent revision of the IMCO-code. We will therefore study this accident more closely. Some of the pages of the captain's report are reproduced in Appendix 3, from which we see that part of the crew on a stormy night jumped into a rough sea. They were picked up by 2 lifeboat crews which did not check the numbers saved until a considerable time had elapsed. Consequently an effective search started too late and the three men probably drowned.

From the above we may assume that in these accidents not a single person has been fatally poisoned by the big quantities of gases involved, which are considered to be vaguely perceptible and extremely poisonous with a delayed effect. This result is surprising and shows that the threat from these gases is overrated. This is not to say that we should stop fearing them and stop our precautions, but on the other hand it should not be necessary to be as careful as they are, for instance, in Denmark. Here they have banned fertilizers liable to self-sustaining decomposition, and, in addition, have stirred up a tremendous public reaction against flue-gases from fires where even very small amounts of fertilizers are involved.

Appendix 4 shows various cuttings from Danish papers sounding alarms about the extreme toxicity of fumes from decomposing compounds. One of the cuttings reports a fire in a barn as a result of which 6 persons were hospitalized for ensuing gas poisoning. Another big alarming headline has a small sub-title stating that nearly all the compounds were removed from the store before the fire. Still another tells of the partial evacuation of a village because of the fire in a nearby farmhouse where 3 tons of compounds were stored. During the whole fire period this fertilizer was constantly kept covered by foam. In view of all this, we do not find it surprising that the Danes have drafted the most severe storing rules for compounds known, actually so severe that they have hesitated for years to enforce them. Reverting to the poisonous character of the decomposition gases, it is our responsibility to respect that poisonous character. On the other hand, it is to the advantage of everyone to avoid any kind of hysteria among the population. Here we might try to calm people down by telling them that we still do not know of any person who has been killed by gas in storage accidents from even larger compound decompositions.

It might often be useful to evaluate whether there is any great chance that a fertilizer will be liable to self-sustaining decomposition without actually conducting tests upon it. A diagram for an easy evaluation is enclosed as Annex 5. It is a recalculation of information in Mr Mostad et al's paper at the ISMA Stresa meeting. The values found should, however, only be regarded as a first guesstimate and be confirmed by a subsequent trough test.

3. THE SAFETY CODES

3.1 The safety rules for international RAIL transport (RID) (2) appear as Appendix 1 to the "Convention Internationale concernant le Transport des Marchandises par chemins de fer (CIM)". RID has been in existence for decades and although it is frequently revised (one revision in 1962 and one in 1967), parts of it strongly need to be revised now. The RID code is the mother code for all modes of inland transport.

3.2 The safety rules for international AIR transport are covered by the RAR codes (3), which was set up by the International Air Transport Association. This code differs from the RID code in places where its special mode of transport should not necessitate this. The reason is that the RAR follows national air transport rules in USA. The RAR code is frequently revised and the last revision was made in 1970.

3.3 The safety rules for international SEA transport are based on the "Safety of life at Sea (SOLAS)" convention drawn up by the UN in 1960. The "Inter-Governmental Maritime Consultative Organization (IMCO)" was established to work out the necessary transport codes. Among these is an international dangerous goods code which was approved in 1965 (4). The code follows the classification system drawn up by the UN "Committee of Experts on the transport of dangerous goods" under its Economic and Social Council (ECOSOC) (5). The classification system used does not correspond with either the RID or the RAR systems. This UN classification is the most modern one and will in the future probably be used for all modes of transport (except air transport). We should note that in the name of the IMCO-organization we find the word "consultative" which indicates that IMCO decisions are only advisory which should subsequently be enforced by national authorities. The different IMCO-codes are revised once or twice a year.

3.4 The safety rules for the international transport of dangerous goods by ROAD are relatively new. Analogous to the CIM agreement for rail transport, the CMR (Convention relative au contrat de transport international des Marchandises par route) is the corresponding agreement for road transport. Corresponding to RID for rail transport we have the ADR for road transport (European Agreement concerning the international carriage of Dangerous goods by Road) (6). The agreement referred to was reached in the Inland Transport Committee of the UN Economic Commission for Europe (ECE) in 1950. The code was completed and enforced in 1968. Although it is set up by the UN it follows the RID classification system for practical reasons. It is, however, obvious that there is great need for a uniform classification system for dangerous goods by all modes of transport. This system is ready - the UN classification system. A joint RID/ADR revision programme has already started. About 1974/75 the two main inland codes RID and ADR will be transferred to the UN-system.

3.5 In parallel with its occupation with ADR, the ECE Inland Transport Committee also drafted a code for the international transport of dangerous goods by INLAND WATERWAYS (inland navigation) the ADN (7). This code was, however, dropped in the final stages because the committee was under strong pressure to complete the joint RID/ADR revision. Work on ADN will therefore not be resumed until

harmonization of the rail and road codes with the UN-code is completed in 1974/75. In the meantime the need for an inland waterways-code was mainly felt in the case of Rhine transport. The Commission Centrale pour la navigation du Rhin copied what they could use from ADN(and RID) and hurriedly made a new simpler code: Reglement pour le transport des matieres Dangereuses sur le Rhin (ADNR) (8). This code was enforced on January 1st this year.*

3.6 The UN classification system has already been mentioned (paragraph 3.3) (5). In the year 1964 the UN committee of experts on the transport of dangerous goods started the task of drafting a code for packaging materials for dangerous goods. Instead of detailed instructions for construction and materials to be used, the new rules instead have special tests which the package has to pass without deterioration. Work on the code was completed and the code adopted in 1969.

3.7 We have one more code of interest to the fertilizer manufacturer: the IMCO code of safe practice for bulk cargoes (15). This code deals with stability considerations for ships sailing with bulk cargoes.

4. COMPARISON BETWEEN THE DIFFERENT TRANSPORT CODES

In Appendix 6 we can see the difference between the various international transport codes. In the following paragraphs we have excluded the RAR code from further comparisons because it is of minor importance to us. There remain the two main classification systems.

4.1 The UN classification (including IMCO) has 9 classes and, if sub classes are included, 16 in all. The Inland system has 7 classes or, including sub classes, 14 in all. The systems differ in that some classes in the Inland codes are Non-restrictive (Class IIIa, b, c, IVa and c) as opposed to the rest which are restrictive. Another difference between IMCO and the Inland codes is that in IMCO every substance has its own page where all restrictions are to be found. In the

*In case of need this code will also be enforced on the Danube (UN document E/CN.2/CONF.5/R.235/Add.5 of 19.4.1972).

Inland codes, however, the volume of the code is kept down through the use of cross references. For this reason, the code is more difficult to follow. In the IMCO code, there are two exceptions to the requirement for warning labels: all commodities in class 9 are exempted and consignments which can be stowed, handled and identified as a unit need not be marked individually (IMCO code page 0016). Going into more detail, we see that the miscellaneous class (class 9) in the UN system does not exist in the Inland codes. The divisions in the explosives class are also different in the two systems. IMCO (UN) divides the explosive substances according to the nature of their hazard, while the Inland codes divide them according to the nature of the articles. The IMCO system is the more modern one. The Russians, however, have just made suggestions for revising it by placing all chemically related products together. For instance all nitrates are put together, all chlorates and so on. In the USA a new code for bulk cargoes has been set up by the National Academy of Sciences (16) (see Appendix 9). This system has only 4 classes, according to the type of hazard, fire, health hazard, pollution hazard etc. The introduction of this system has caused considerable trouble and it may therefore take some time before it makes the task of the transporters (of bulk cargoes) more complicated.

4.2 The Inland codes apart from RID have a very interesting point in common: the requirement for written instructions for emergency action. Such information has long been used in the USA where the Manufacturing Chemist's Association developed the CHEM-card system. In Europe a similar system was originally set up in the Netherlands. When ADR was enforced in Europe, no common European card system was available and the European council of the chemical manufacturer's Federations (CEFIC) undertook to draft an all-European card system, the transport emergency (TREM) card system. As an example of the cards here, a copy of a Swedish card for nitrate compound fertilizers (No R 104) is reproduced in Appendix 10 and the corresponding master card will be found as Appendix 11. It should be mentioned that the Swedes very much dislike the reference to ADR on the card since it classifies one of the most popular nitrogen fertilizers, the AN-limestone 26N, which is free in IMCO. The idea of using written information is a sound one and similar cards will be used also for other modes of transport. Recently the International Chamber of Shipping introduced its "Tanker Safety Guide (chemicals)" for liquid chemicals in bulk (17)

which requires the use of special cards for ammonia and nitric acid, for example.

5. THE IMPORTANCE OF THE CODES TO THE FERTILIZER MANUFACTURER AND ISMA/APEA ACTIVITIES

Since ISMA/APEA established their joint Working Party and various technical committees in 1966, they have had a marked influence on the regulation of the transport of fertilizers. Their contacts are set out in Appendix 8.

5.1 One of the most important instruments in our contacts with the authorities is the former APEA Sub-Committee C (now ISMA/APEA Sub-Committee C). This committee is trying to follow all kinds of activity alongside the governmental bodies. As its chairman I have the advantage of being a national delegate to some of the code-meetings as well as being a national delegate to CEFIC (see paragraph 4.2). The ISMA/APEA Sub-Committee C has drafted numerous suggestions for the different transport codes.

5.2 The activity of the ISMA/APEA Sub-Committee C depends to a large extent on being well informed and we have a fortunate contact with CEFIC with which ISMA/APEA have a consultative status with its WP on transport. CEFIC also has a sub-committee drafting the TREM-cards. All cards relating to our own products are drafted by us. Our relations with CEFIC are so arranged that they leave all special fertilizer-matters to us. Unfortunately, the amalgamation of EFTA and EEC has resulted in a decision to wind up the whole of CEFIC from January 1st 1973 and to transfer its activities to the corresponding organization inside EEC: Secretariat International de groupements professionels de l'Industrie Chimique de la CEE (SIIC). Because CEFIC is recognized by governmental bodies and SIIC is not, it has been suggested that SIIC be renamed CEFIC from January 1st 1973. If this renaming is not done, we will have to take action to obtain consultative status with SIIC from next year onwards.

5.3 The IMCO dangerous goods code has been of the greatest interest to us in ISMA/APEA. The first revision relating to fertilizers was the one made as a result of a Norwegian submission (9) which resulted in the removal of calcium nitrate fertilizer from the IMCO code. About this time IMCO was worried by the "Sophocles" accident and studied

the stringent Dutch regulations enforced after the Vlaardingen decomposition (10). The following 3 IMCO meetings made practically no progress with new rules for AN-fertilizers. ISMA/APEA then managed to arrange an informal IMCO expert meeting on August 8-9th 1968. This conference laid down the basis for the present text for AN-fertilizers (11)*. The unofficial draft was accepted by the IMCO MSC (Maritime Safety Committee; its decision-making body) in the autumn of 1968 and has proved to be the best compromise obtainable. The liability to self-sustaining decomposition is to be tested in the trough test, submitted by ISMA/APEA (12). Another item of interest is that pure AN is now separated in the code from AN-fertilizers. The text of the latter is reproduced in Appendix 7. From this it can be seen that fertilizers with AN-content above a certain limit are entered in class 5.1 whereas compounds with a lower AN-content but liable to self-sustaining decompositions are transferred to class 9 where there is no demand for a danger label on each bag. The regulations for the different types of fertilizers are in many ways more liberal than those of the Inland codes. This is the case for AN-limestone, AN-ammonium sulphate mixtures and compounds. Many of the types which are free in IMCO but still classified in the Inland codes include the most popular fertilizers used (for instance AN-limestone 26-0-0) and are transported by road and rail without comment. Some IMCO delegates are of the opinion that the code is too liberal as it accepts, for example, free of restriction a mixture of 70% AN and 30% potassium chloride. On the other hand it only accepts 10% potassium nitrate in addition to the AN-content in compounds. At the ISMA/APEA WP-meeting in Vienna, January 1970, the Austrians asked for support in asking for the potassium nitrate limit to be raised. This was, however, rejected as a result of warnings from Dr Schaefer and the author because of the fear that, if the AN-fertilizers were brought up for discussion again, we might lose some of the concessions gained earlier. The borderline between the AN-fertilizers and explosives has recently been discussed in an informal IMCO-meeting 25.6.1971 on the initiative of ISMA/APEA and the new text agreed upon followed our suggestions. As we have seen, the IMCO rules are liberal so that the sea transport of, for

*In this reference the names APEA and Norway are missing from the list of participants present. ISMA/APEA was represented by Dr Schaefer and Norway by the author.

instance, AN should present no difficulty, but this is not in fact the case. The reason is that harbour rules are generally more stringent than IMCO rules. In this respect, each port is a law unto itself and enforces its own regulations. IMCO is aware of the fact and is drafting suggestions for harbour rules but unfortunately can do little to enforce them.

5.4 The inland codes (see Appendix 12) are all based upon the original RID text and do not recognize the hazard of self-sustaining decomposition. This was also the case with the IMCO-code before 1968, and non-recognition of the hazard might still be justified for rail and road transport. It must, however, have been by mistake that the Rhine-code ADNR did not recognize this danger. Accidents have shown that self-sustaining decomposition represents a hazard for river barges as well as for ocean-going vessels and action is being taken to correct the code.

5.5 The rules for packaging materials, worked out by ECOSOC's Committee of Experts (5) (13) has given rise to considerable discussion because some of the tests are so severe (for instance the drop test) that some of the most widely used packaging materials do not pass it. In consequence, ISMA/APEA suggested that dangerous goods should be divided into different groups according to their degree of danger (14). This principle was accepted by the Committee of Experts which has now* been invited to discuss the following suggestion:

		Height of drop in drop test
Group I	Very dangerous substances	1.8 m
Group II	Dangerous substances	1.2 m
Group III	Less dangerous substances	0.8 m

It has been proposed that all nitrates go into Group III and this should be acceptable to fertilizer manufacturers.

5.6 As already mentioned (in paragraph 3.7) the bulk transport of fertilizers might endanger the stability of a ship. The IMCO code for bulk cargoes (15) uses the "angle of repose" as a measure of the ease

*in December this year

with which the cargo will tend to shift. This angle is defined as the angle between a horizontal plane and the cone slope obtained where the bulk cargoes are emptied onto this plane. All cargoes with angles of repose below 35°C are here regarded as hazardous from a stability point of view. For vessels, except those specially constructed for bulk cargoes, certain precautions should be taken by the captain of the vessel when the angle of repose is below 35°. He should therefore always be informed about the angle of repose of the commodity. Another factor of importance for bulk cargoes is the stowage factor of the commodity which is usually given in cub. feet/long ton (equal to 35.9/volume weight (vibrated) in kg/dm^3). The hazard mentioned has claimed its victims. On September 3rd 1967 the M/S "Dux" capsized and sank off the SW coast of Norway with 1.900 tons NPK in bulk and thirteen men drowned. The angle of repose of the cargo was relatively low; 30°. Another example of vessels capsizing with bulk fertilizers is the M/S "Sophocles" accident. We also know of a number of narrow escapes especially with Norwegian, Danish and Dutch vessels. I shall only mention the vessel M/S "Finn Germa" with bulk compounds which in 1967 had to enter a port of distress to trim the vessel of a dangerous list. We should realise that the better the prilling of the fertilizer, the more hazardous it is likely to be to the ship's stability.

6. THE JOINT RID/ADR REVISION

The strong need for a uniform classification system has been mentioned earlier (in paragraph 3.5), and revisions have already started. One of the first results to emerge from these revisions was that the RID/ECE Group of Experts - meeting primo September 1971 - agreed that Inland warning labels are to be abandoned* from January 1st 1973. The only exception will be a permission to use the St Andrew's Cross label for substances which are not poisonous enough to justify the use of the more drastic UN "skull and crossbones" symbol. The joint committees also suggested that the ECOSOC committee of Experts should adopt the St Andrew's Cross label in the UN system - for slightly toxic substances. The RID class IIIc will be revised during the third quarter of 1973.

*and to be replaced by the UN ones.

7. RESPONSIBILITY TO THIRD PERSONS

Although the IMCO and similar local dangerous goods codes request that all kinds of hazards according to the code regulations should be declared, such declarations are not always given. The European Shippers' Council and the European National Shipowner's Association (CENSA) in October 1971 therefore agreed to stress the importance of proper declarations (Appendix 14). If some kind of undeclared hazard (for instance a liability to self-sustaining decomposition) should result in an accident, this will not be covered by insurance companies. It will also indicate a violation of the agreement mentioned as well as of the IMCO code. Over and above this, such an accident might be used as a pretext for IMCO to tighten the rules regarding the commodity concerned.

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2. Reglement International concernant le transport des marchandises Dangereuses par chemins de fer (RID), Office Central Gryphenhuebemli weg 300, 3000 Berne, Switzerland.

3. IATA Restricted Articles Regulations, International Air Transport Ass. 1155 Mansfield St., Montreal 113, Quebec, Canada.

4. Inter-Governmental Maritime Consultative Organization (IMCO): International Maritime Dangerous Goods Code, Vol. 1-3, 101/104 Piccadilly, London W1.

5. Transport of Dangerous Goods, United Nations publication, Sales No E 70 VIII 2, November -70.

6. European Agreement concerning the international carriage of Dangerous Goods by Road (ADR), Inland Transport Office, Palais des Nations, 1121 Geneva 10. An English more handy volume may be obtained from HMSO, 48 High Holborn, London.

7. European Agreement concerning the International carriage of Dangerous goods by inland Waterway (: by fluvial Navigation) (ADN). Not yet ratified.

8. Reglement pour le Transport des Matiers dangereuses sur le Rhin. Commission centrale pour la Navigation du Rhin, Palais du Rhin, Strassbourg.

9. IMCO document CDG XI/WP 24 of 26.10.66, Calcium nitrate

10. IMCO document DCG XII/WPI of 8.12.66, Dutch regulations

11. IMCO document CDG XV/WP4/Add. 1 of 27.9.68, Report of informal group of experts.

12. IMCO document CDG XIV/WP2 of 19.2.68, Trough test.

13. IMCO Annex 1 to the International Dangerous Goods code.

14. UN - documents E/CN2/conf. 5/R193 and R202, ISMA/ APEA letters.

15. IMCO code of safe practice for bulk cargoes, see (4).

16. Chem Eng. Progr. 66 No 2, page 59 (1970).

17. Tanker Safety Guide (Chemicals), International Chamber of Shipping 30-32 St. Mary Axe, London EC3 A 8ET.

Post script

After having finalized the present manuscript I was presented the American demonstration of the new "Hazard Information System" at IMCO September 14th this year. This system has so many interesting points that I think a short survey of the system is of interest.

The US Department of Transportation is now following the UN classification system as well as using labels which for the greater part are almost identical to the UN-ones. Each label has a two-digit number, where the first one indicates the UN class number and the last one the secondary hazard. Each full number on the label corresponds to a TREM-CARD with the same number. In all the Americans expect to keep the number of cards below 65. The list of cards is enclosed together with the two cards which are nearest to our ammonium nitrate TREM-CARD. It will appear that none of the US-cards are fully covering, but according to the US Authorities - good enough for a preliminary treatment, and this is the cost we have to pay to keep the number of cards at a low level.

NITROGEN FERTILIZERS, HAZARDS INVOLVED

CHEMICAL FAMILY	TRANSPORT HAZARD	CLASSIFIED AS	WARNING LABEL
N - H (ammonium compositions only)	-	Not classified	-
N - O (nitrate compositions only)	Intensifies fires	Oxidizing agent	Yellow
N - H (Ammonium) and N - O (nitrate pure)	Intensifies fires Might detonate	Oxidizing agent	Yellow
N - H (ammonium) and N - O (nitrate) (fertilizers)			
<30%x) inert matter: A1 <20%x) limestone : A2 <55%x) sulphate of ammonia : A3 <30% P and/or K-component : A4	Intensifies fires Might detonate	Oxidizing ageent	Yellow
>30% P and/or K-component : B	Liable to self-sustaining decomposition	Miscellaneous dangerous substances	
>30% P and/or K-component :	NOT liable to self-sustaining decomposition	-	-

x) Substances with more diluant (less ammonium nitrate) than in the limits given are NON HAZARDOUS (IMCO)

Annex 1

Accidents with solid fertilizers
- ISMA/APEA reporting scheme -
Status August 1972

Reg. No.	Accident date	Fert. 1)	Stage 2)	Reg. No.	Accident date	Fert. 1)	Stage 2)
A/2	3.9.49	C	BS	I/6	14.3.67	C	P
(16) 3)	June 50	C	BS	(19)	15.3.67	C	P
(1)	19.9.56	C	BS	(10)	26.6.67	C	BS
(11)	8.3.57	C	BS	(7)	26.8.67	C	BS
I/1	10.11.58	C	P	(8)	31.8.67	C	BS
I/2	?	C	P	I/10	14.9.67	C	P
(2)	2.3.61	C	BS	(9)	Sept. 67	C	T
(18)	29.11.62	C	S	A/9	18.7.68	C	S
(12)	11.2.63	C	BS	A/8	25.7.68	C	BS
(5)	5.11.63	C	BS	A/20	4.9.68	AN	T
A/10	17.12.63	C	BS	(17)	Oct. 68	C	BS
I/8	23.2.64	C	BS	A/19	3.11.68	AN	T
A/15	27.8.64	C	BS	A/21	22.11.68	AN	T
A/18	19.2.65	C	BT	A/13	10.1.69	CAN	P
A/3	5.4.65	C	BS	(23)	13.1.69	C	P
(4)	14.4.65	C	S	(20)	Apr. 69	C	T
A/6	31.3.66	C	BT	A/14	22.4.69	C	T
(22)	8.7.66	C	S	A/12	9.5.69	C	T
(15)	4.8.66	C	BS	A/24	9.8.69	C	T
I/9	20.9.66	C	P	A/17	9.1.70	C	S
(24)	?	C	S	I/12	13.4.70	C	BS
I/3	22.9.66	C	P	I/11	18.4.70	C	S
A/7	8.11.66	C	P	I/13	2.5.70	AN	P
I/4	11.11.66	C	P	I/14	6.5.70	C	S
I/5	12.11.66	C	P	I/15	12.5.70	C	S
A/1	1.12.66	C	P	I/16	11.9.70	C	P
I/7	9.12.66	C	BS	A/25	13.10.70	C	P
A/4	24.12.66	C	BS	A/27	27.4.71	C	S
A/5	2.1.67	C	T	I/17	13.2.72	C	P
				A/28	6.6.72	AN	T

1) C = Compound, AN = Ammonium Nitrate
CAN = AN Limestone

2) B = Bulk, P = Production,
S = Storing, T = Transport

3) () = Unreported accident

- That because of the suffocating, poisonous gases the conditions were such amidship that crew still aboard fled as far as possible out along the poopdeck.

- That the remaining crew jumped overboard when both lifeboats came up to the stern, were taken up and brought to M/S "Ulysses".

- That when a check was made 3 of the crew were missing, (names).

- That the lifeboats returned to the drifting wreckage and resumed the search for these 3 members of the crew.

- That M/S "Sophocles" sank at 06.52 hrs. 45.45 NL 24.15 WL.

- The corpse of one of the crew was found next day in the sea by a British aircraft.

- That the search with boats for the missing men were discontinued 08.37 hrs. because of the increasing wind and the poor weather conditions, and that the crews of both lifeboats were taken aboard the M/S "Ulysses".

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The author's additional remarks:

1) M/S "Sophocles" was tweendecked and thus not too well suited for bulk cargoes.

2) The temperature readings in the cargo in a 1" tube through the cargo holds went down in all holds according to the ship's journal. In Hold 3 it went down from 28.8°C Feb. 2nd to 24.3°C Feb. 18th. The air temperatures went down in the same period from 25.5° to 15.5°C.

3) A lamp was submerged in the cargo exactly where the first heat was discovered.

4) The "stand by" lifeboat order 02.30 hrs. resulted in the definite stopping of the propulsion machinery.

5) The amount of extinguishing water applied was about 20 tons, in itself not enough to endanger the stability of the ship.

6) The vessel sank after having capsized. Here most probably a shifting of the cargo played an important part, since the vessel was extremely exposed to the bad weather conditions after the propulsion machinery was stopped.

The sinking of M/S "Sophocles" 19.2.1965 sailing from Aruba to Oslo with 5.000t NPK in bulk.

Unofficial translation of extract of master's report

G.H. Kuipers, master of the Dutch motor vessel "Sophocles" declares:

.....

- That the ship February 16th and 17th had wind from SSO to S, strength 8-9* with a high SSO swell. The ship plunged heavily, rolled violently and took heavy lurchings with breakers over decks and hatches.
- That the holds and the cargo were inspected by the first mate February 18th and nothing was found to remark.
- That the course of the daily temperature readings was found normal.
- That the 2nd mate 00.45 hrs. was informed by the duty engineer that smoke evolution was observed from a ventilator hold 3, aft. end, port-side.
- That the 2nd mate informed the first mate and the captain.
- That he contacted KNSM (Amsterdam) and asked for instructions regarding the chemical reactions in complex fertilizer 14-14-14.
- That he then asked ships in the vicinity of the Azores for assistance.
- That he then checked all the access hatches to hold No. 3, but could find or control nothing because of the violent smoke evolution.
- That he ordered all openings to hold No. 3 being closed.
- That the temperatures in hold No. 3 were checked, whereby those in the lower hold were still found normal, but that at 02.00 hrs. a temperature of 95°C was found at the height of the tweedeck, aft.

* fresh to full gale, author's remark.

UNDER GÅRDBRAND:

Søften i alarmberedskab

Farlig i tilfælde af brand
Dangerous fire-accident

Farmhouse fire: Emergensy-state in village søften

Katastrofealarmering til eksplosionsbrand i lager

Catastrophy alarm in explosion - like fire in store

Bornholmsk egn afspærret som giftgas-inficeret efter brand i gødning

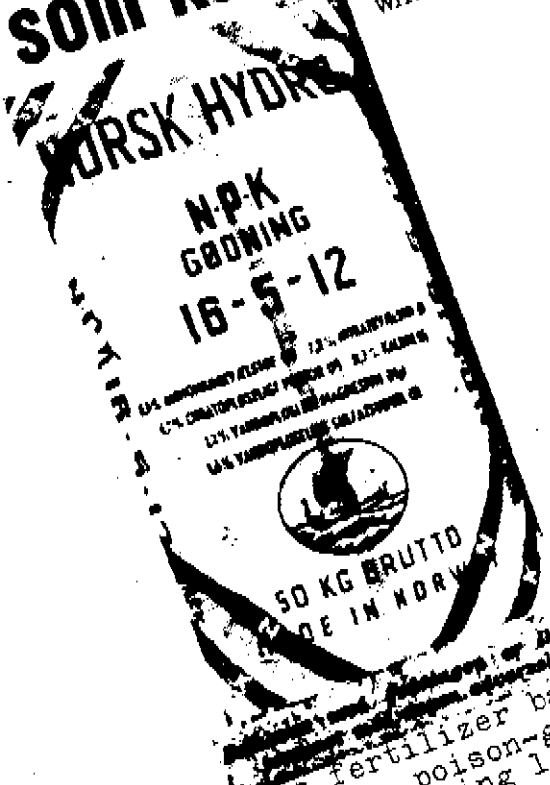
67 i farezonen blev indlagt

Sygehus i katastrofeberedskab klarede behandlingen

Area in Bornholm isolated because of toxic gas from fertilizer fire - 67 PERSONS HOSPITALIZED

Landbrug opbevarer gødning, som kan være dødbringende

The agriculture stores fertilizer which might be lethal



New warning from poisonous gas from fertilizer

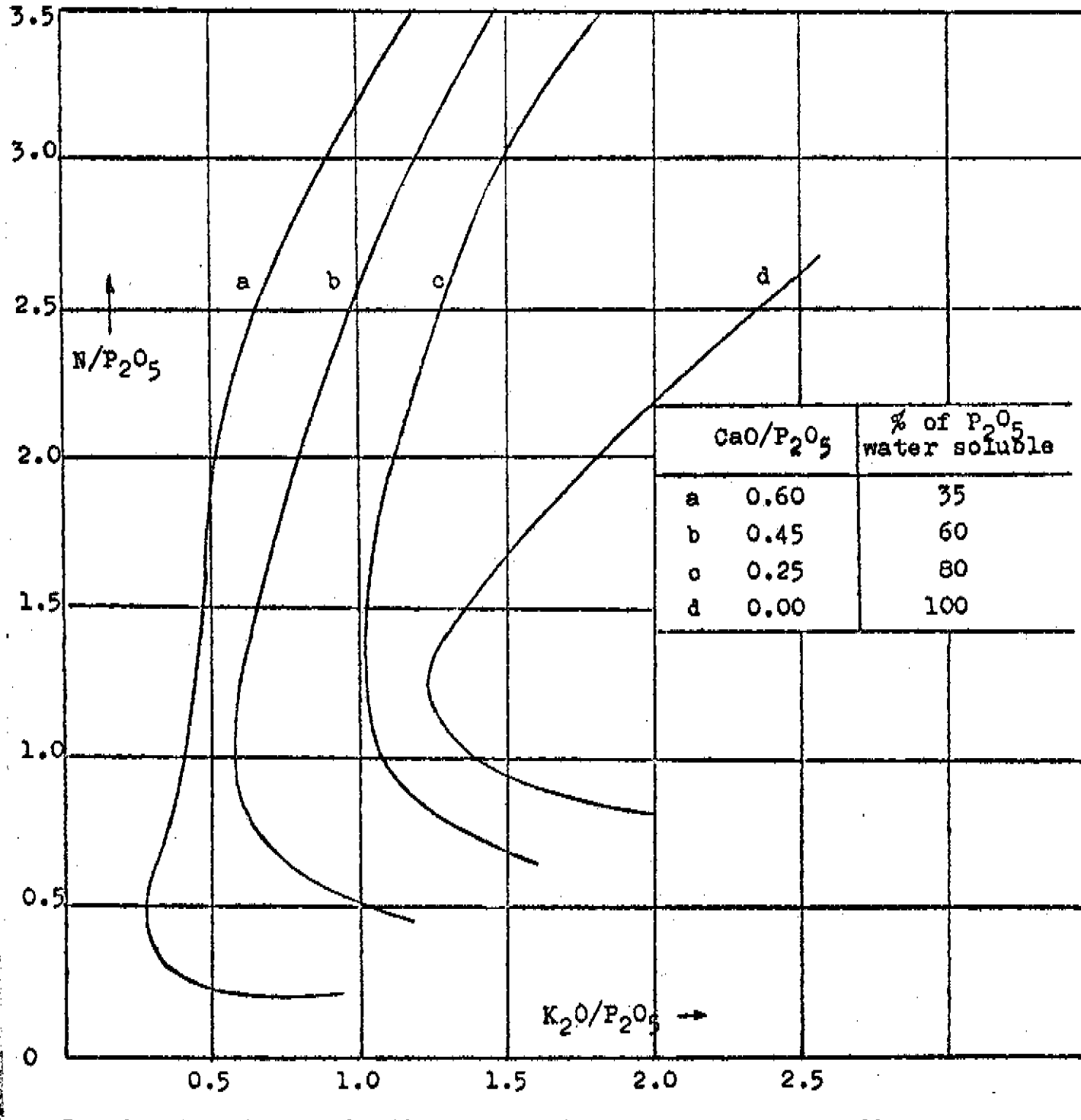
NY ADVARSEL MOD GIFTGAS FRA GØDNING

SELF-SUSTAINING DECOMPOSITION OF NPK FERTILIZERS

containing:

AMMONIUM NITRATE
POTASSIUM CHLORIDE
CALCIUM } PHOSPHATES
AMMONIUM }

Self-sustaining decomposition occurs to the right of the curves.



	CaO/P_2O_5	% of P_2O_5 water soluble
a	0.60	35
b	0.45	60
c	0.25	80
d	0.00	100

Results based on this diagram should be regarded as a first approach only and should be confirmed by subsequent trough tests.

INTERNATIONAL TRANSPORT CODES FOR DANGEROUS GOODS

The different codes are:

UNIVERSAL CODE: the UN-code: TRANSPORT OF DANGEROUS GOODS (1970) Volumes I-IV.
SEA TRANSPORT: The Inter-Governmental Maritime Consultative Organization (IMCO): international Dangerous Goods Code, Volumes 1-9.
RAIL TRANSPORT: Règlement international concernant le transport des marchandises Dangereuses par chemin de fer (RID), Annex I & alphabetical list (1967).
ROAD TRANSPORT: European Agreement concerning the international carriage of Dangerous goods by Road (ADR), Annexes A & B.
INLAND WATERTRANSPORT: European Agreement concerning the international carriage of Dangerous goods by fluvial Navigation (ADN), Annexes A & B, not yet ratified.
RHINE TRANSPORT: The ADN-Rhine (ADNR), Annexes A & B.
AIR TRANSPORT: The International Air Transport Association (IATA):Restricted Articles Regulations (RAR).

CLASSIFICATION OF COMODITIES ACCORDING TO TYPE OF DANGER:

ARTICELS	Sea IMCO (UN-code)	Inland RID, ADR ADNR	Air IATA: RAR
	class:	class:	class:
EXPLOSIVES:			
With mass explosion risk	1,1		)
With no mass explosion risk and minor expl. effects	1,2		) Expl. (2)
With fire hazard but minor or no expl. effects	1,3		)
With no significant hazard	1,4		)
Expl. substances and articles		Ia	)
Art. filled with expl. subst.		Ib	)
Igniters, fireworks		Ic	)
GASES COMPRESSED, LIQUEFIED OR DISSOLVED UNDER PRESSURE	2	Id	(Nonfla.G. (Fla.G. (2,5)
FLAMMABLE LIQUIDS			
Liquids, flashp. $<-18^{\circ}C$	3,1	)	)
Liquids, flashp. $>-18; <23^{\circ}C$	3,2	) IIIa	) Fla.L (3)
Liquids, flashp. $>23^{\circ}C$	3,3	)	
FLAMMABLE SOLIDS	4,1	IIIb	)Fla. S (4)
Spontaneously combustible	4,2	II	)
Emitting flammable gases when wet	4,3	Ie	)
OXIDIZING SUBSTANCES	5,1	IIIc	) Oxy.M (5)
Organic peroxides	5,2	VII	) L(6)
POISONS (Toxic substances)	6,1	IVa	(Pois.B S(6.5.)
Infectious, repugnant	6,2	VI	(Pois.C(6.9.)
RADIOACTIVE SUBSTANCES	7	IVb	Rad. M (7)
CORROSIVES	8	V	Cor. L (1)
OTHER RESTRICTED ARTICLES			) ORA.A) ORA:B) ORA.C (8)
MISCELLANEOUS DANGEROUS SUBSTANCES	9		- (8,5.)

Extract from the IMCO Classification

Class 5.1 Oxidising agents

AMMONIUM NITRATE FERTILIZERS

(a) Type A

(A1) Uniform non-segregating mixtures of ammonium nitrate with added matter which is inorganic and chemically inert towards ammonium nitrate, containing not less than 90 % of ammonium nitrate and not more than 0.2 % of combustible material (including organic material calculated as carbon), or containing less than 90 % but more than 70 % of ammonium nitrate and not more than 0.4 % of total combustible material.

(A2) Uniform non-segregating mixtures of ammonium nitrate with calcium carbonate and/or dolomite, containing more than 80 % but less than 90 % of ammonium nitrate and not more than 0.4 % of total combustible material.

NON-HAZARDOUS:
Uniform non-segregating mixtures of ammonium nitrate with calcium carbonate and/or dolomite, containing not more than 80 % of ammonium nitrate, provided they contain not less than 20 % of these carbonates (of minimum purity 90 %) and not more than 0.4 % of total combustible material.

(A3) Uniform non-segregating mixtures of ammonium nitrate/ammonium sulphate containing more than 45 % but not more than 70 % of ammonium nitrate and containing not more than 0.4 % of total combustible material.

NON-HAZARDOUS:
Uniform non-segregating mixtures of ammonium nitrate/ammonium sulphate containing not more than 45 % of ammonium nitrate and not more than 0.4 % of total combustible material.

(A4) Uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type containing more than 70 % but less than 90 % of ammonium nitrate and not more than 0.4 % of total combustible material.

Properties

Crystals, granules or prills. Wholly or partly soluble in water. Supporters of combustion. A major fire aboard a ship carrying these substances may involve a risk of explosion in the event of contamination (e.g. by fuel oil) or strong confinement. An adjacent detonation may also involve a risk of explosion. If heated strongly, decompose giving off toxic gases and gases which support combustion.

GENERAL NOTES:

(1) All nitrate ions for which there is present in the mixture a molecular equivalent of ammonium ions must be calculated as ammonium nitrate.

(2) Ammonium nitrate products which are liable to self-heating sufficient to initiate a decomposition are prohibited.

(3) The compatibility of non-hazardous ammonium nitrate mixtures with other materials which may be stowed in the same compartment should be considered before loading.

NOTE:

For mixtures of the same components as (A4) above but containing not more than 70 % of ammonium nitrate, see Type B mixtures under Class 9.

AMMONIUM NITRATE FERTILIZERS

(c) Type C — Label — Stowage — Packing:

Fertilizers containing ammonium nitrate not otherwise specified. — As specifically designated by the competent authority of the country concerned.

Class 9 Miscellaneous Dangerous Substances

AMMONIUM NITRATE FERTILIZERS

(b) Type B

Uniform non-segregating mixtures of nitrogen/phosphate or nitrogen/potash types or complete fertilizers of nitrogen/phosphate/potash type containing not more than 70 % of ammonium nitrate and not more than 0.4 % of total added combustible material or containing not more than 45 % of ammonium nitrate with unrestricted combustible material.

NON-HAZARDOUS:
Mixtures of the same composition and within the limits mentioned above which, as a result of testing in the Trough Test (see IMCO Code Pages 9006 to 9010) are found to be free from the risk of self-sustaining decomposition provided that they do not contain an excess of nitrate calculated as potassium nitrate, (above the ammonium nitrate content calculated as in General Note (1) below) greater than 10 % by weight of the mixture. Mixtures in which excess nitrate is present in greater proportion than this should be referred to the competent authority.

GENERAL NOTES

(1) All nitrate ions for which there is present in the mixture a molecular equivalent of ammonium ions must be calculated as ammonium nitrate.

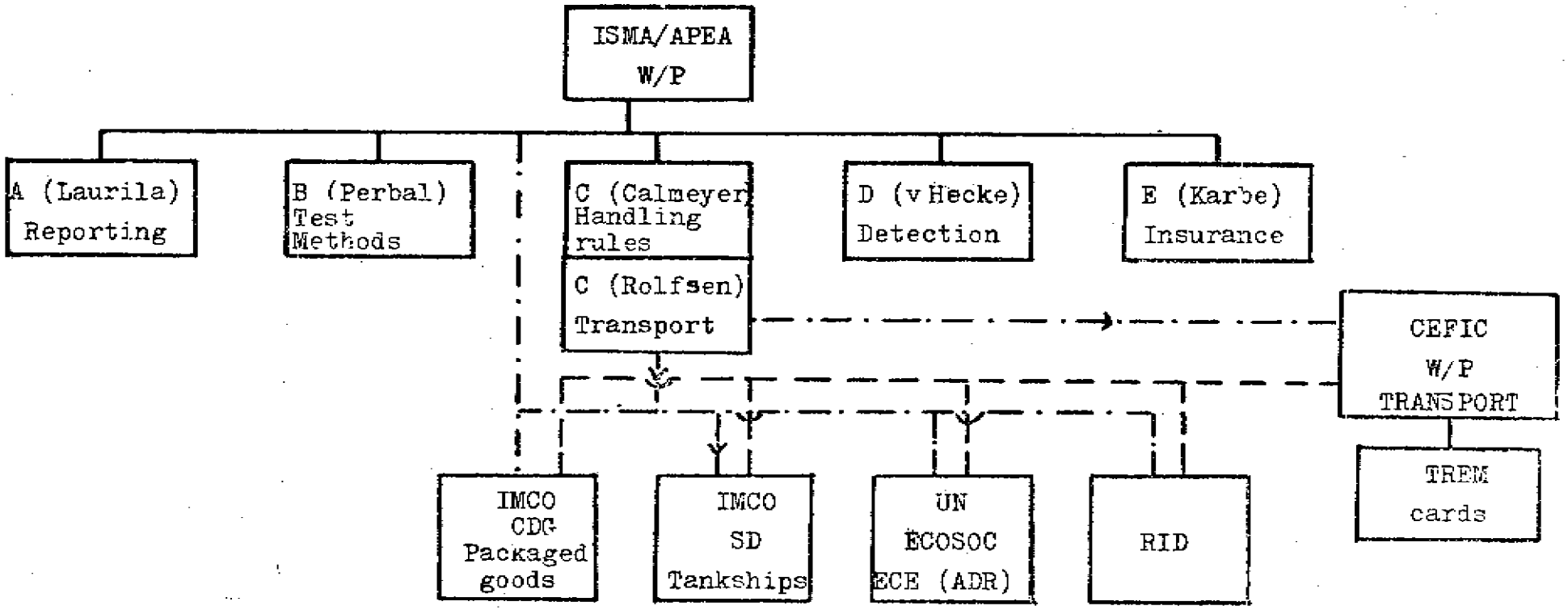
(2) Ammonium nitrate products which are liable to self-heating sufficient to initiate a decomposition are prohibited.

(3) The compatibility of non-hazardous ammonium nitrate mixtures with other materials which may be stowed in the same compartment should be considered before loading.

Properties

Usually granules. Wholly or partly soluble in water. These mixtures may be subject to self-sustaining decomposition if heated; the temperature in such a reaction can reach 500° C. Decomposition, once initiated, may spread throughout the remainder producing gases which are toxic. None of these mixtures is subject to the explosion hazard.

ISMA/APEA'S CONTACTS WITH TRANSPORT ORGANIZATIONS, DANGEROUS GOODS



— — — — Consultative status

—·—·—·— Consultative status in special matters

Annex 8

Table 1. Hazard evaluation ratings and classifications for selected commodities.

IMCO Class			Fire (i)	Health (ii) Vapor Irritant	Health (iii) Liquid or Solid Irritant	Health (iv) Poisons	Water Pollution (v) Human Toxicity	Water Pollution (vi) Aquatic Toxicity	Water Pollution (vii) Aesthetic Effect	Reactivity (viii) Other Chemicals	Reactivity (ix) Water	Reactivity (x) Self-Reaction
3.1	Acetone	(C Flam. Liq.)	3	1	0	0	1	1	1	2	0	1
3.1	Acrylonitrile	(C Flam. Liq.)	3	3	1	3	4	3	2	3	0	3
3.2	Ethyleneimine	(B Flam. Liq.)	3*	3	2	4	4	3	3	3	1	3
3.2	Allyl Alcohol	(B Pois.)	3	3	2	3	2	3	2	2	0	1
2	Ammonia, Anhydrous	(Non-Flam. Compr. Gas)	1*	4	2	2	2	2	2	3	2	0
2	Chlorine	(Non-Flam. Compr. Gas)	0	4	2	4	2	3	2	4	1	0
2	Dichlorodifloromethane	(Non-Flam. Compr. Gas)	0	0	0	1	0	0	0	1	0	0
2	Propane	(Flam. Compr. Gas)	4	0	0	0	0	0	0	0	0	0
8	Hydrochloric Acid, 28-35%	(Corr. Liq.)	0	3	3	2	2	2	2	3	0	0
8	Chlorosulfonic Acid	(Corr. Liq.)	0	4	4	4	2	3	2	4	4	0
8	Phosphoric Acid, 75-85%	(Haz. Art.)	0	0	3	1	2	3	2	3	0	0

Ratings are from 0 to 4 in order of increasing severity.
*Indicates fire hazards are unlike those of hydrocarbons.
( ) Indicates current DOT classification.

Annex

NITRATHALTIGA BLANDGÖDSELMEDEL

Korn

ämnens art

Sönderdelas vid brand under avgivande av giftiga gaser: kväveoxider, klor och klorvätesyra
Då sönderdelning påbörjats kan den fortplantas till hela lasten

kyddsutrustning

Lämpligt andningsskydd
Tättslutande skyddsglasögon
Plast- eller gummihandskar
Flaska för ögonsköljning med rent vatten

ÅTGÄRDER VID OLYCKSHÄNDELSE

Meddela polis och brandkår omedelbart • tel. 90'000

- Stanna motorn
- Använd ej öppen låga. Rökning förbjuden
- Sätt ut varningsskyltar och varna andra trafikanter
- Håll allmänheten borta från riskzonen

Spill

- Om ämnet kommit i vattendrag eller avloppsledning eller spillts på jord eller växtlighet skall detta anmälas till polisen

Brand

- Släck med enbart vatten
- Försök ej kväva elden
- Undvik att vistas på läsidan

Första hjälp

- Läkare skall uppsökas då någon visar symtom som uppenbarligen beror på inandning av gaser från branden
- Även om det inte finns några symtom skall läkare uppsökas och detta kort uppvisas
- Beroende på fördröjd förgiftningseffekt skall personer som har inandat röken ligga och vara alldeles stilla. Patienten bör stå under läkarkontroll under minst 48 timmar
- Patienten skall hållas varm
- Använd ej konstgjord andning om patienten andas

Ytterligare upplysningar från tillverkare eller avsändare:

RING TILL:

Utarbetat av CEFIC (CONSEIL EUROPEEN DES FEDERATIONS DE L'INDUSTRIE CHIMIQUE, EUROPEAN COUNCIL OF CHEMICAL MANUFACTURERS' FEDERATIONS), Zurich, med stöd av bästa tillgängliga informationer, dock utan ansvar för att lämnade instruktioner i samtliga fall är tillräckliga och korrekta.

Kan beställas från: Kemikontorets Service AB, Box 6501, 113 85 Stockholm $

V.N.C.I. och S.V.O., Holland, har vetvilligt bistått vid utarbetandet av detta kort

MASTER CARD

CEFIC TEC (R)-104
May 1971
Class II to ADR
Marg. 2371,6c

GE-1 TRANSPORT EMERGENCY CARD (Class)

GE-2 NITRATE COMPOUND FERTILIZER

CA-1q Granules

GE-3 NN-17nop Decomposes in a fire, giving off toxic fumes: nitric oxide, chlorine and hydrochloric acid
NN-9 Decomposition once started can spread through entire mass

GE-4 PD-1 Suitable respiratory protective device
PD-2 Goggles giving complete protection to eyes
PD-3abe Plastic or rubber gloves
PD-5b Eyewash bottle with clean water

GE-5 EMERGENCY ACTION - Notify police and fire brigade immediately
EA-2 Stop the engine
EA-3 No naked lights. No smoking
EA-4 Mark roads and warn other road users
EA-5 Keep public away from danger area

GE-6 SP-16 If the substance has entered a water course or sewer or been spilt on soil or vegetation, advise police

GE-7 FI-2b Extinguish with water only
FI-9 Do not attempt to smother the fire
FI-12 Keep upwind

GE-8 FA-5af Seek medical treatment when anyone has symptoms apparently due to inhalation of the fumes produced in a fire
FA-6a Even if there are no symptoms send to a doctor and show him this card
FA-7abcg Due to delayed effect of poisoning, persons who have inhaled the fumes must lie down and keep quite still. Patient should be kept under medical observation for at least 48 hours
FA-8 Keep patient warm
FA-9 Do not apply artificial respiration if patient is breathing

GE-9 Additional information provided by manufacturer or sender

GE-10 TELEPHONE

GE-11 Prepared by CEFIC (CONSEIL EUROPEEN DES FEDERATIONS DE L'INDUSTRIE CHIMIQUE, EUROPEAN COUNCIL OF CHEMICAL MANUFACTURERS FEDERATIONS) Zürich, from the best knowledge available; no responsibility is accepted that the information is sufficient or correct in all cases

GE-12 Obtainable from

GE-13 Acknowledgement is made to V.N.C.I. and B.V.O. of the Netherlands for their help in the preparation of this card

GE-14 Applies only during road transport

English

Ammonium nitrate-(AN)-fertilizers

CONDITIONS FOR FREE TRANSPORT on the SEA and on the INLAND

	SEA TRANSPORT	INLAND TRANSPORT
Pure AN	Class 5.1 when above AN limits given, and free below those limits $\leq$ 0.2% combustible inlc. organical matter calc. as carbon	Class IIIx when above AN limits given, and free below those limits $\leq$ 0.4% combustible matter
AN-FERTILIZERS	$>$ 80% AN, rest limestone, dolomite, min. 90% pure $\leq$ 0.4% total combustible matter	$>$ 65% AN, rest inerts, as limestone, diatomaceous earth, potassium chloride etc. $\leq$ 0.4% combustible matter.
Sulphate of ammonia salpeter	$>$ 45% AN $\leq$ 0.4% total combustible matter	$\geq$ 40% AN $\leq$ 0.4% combustible matter
Compounds	$>$ 70% AN $\leq$ 10% excess nitrate calc. as KNO_3 $\leq$ 0.4% total combust matter	$>$ 45% AN $\leq$ 10% excess nitrate calc. as KNO_3 $>$ 0.4% combust. matter	$>$ 7% NO_3-N or $>$ 14% total-N $\leq$ 0.4% combust. matter
	$\leq$ 70% AN other conditions as above	$\leq$ 45% AN other conditions as above	
	Class 9: Miscellaneous dangerous substances when liable to selfsustaining decomposition		
	Compounds not liable to selfsustaining decomposition: FREE		
AN-FERTILIZERS not otherwise specified	As specifically designated by the competent authority in the country concerned		

Annex 1.

Ref:20.20.51.

KONINKLIJKE NEDERLANDSCHE STOOMBOOT-MAATSCHAPPIJ N.V.

Amsterdam 1091
Prins Hendrikkade 108-114
Postbus 349
Telefoon 6220 6411
Telegramadres ROYAL AMSTERDAM
Telex 12249 KNSM NSD

Messrs. LINJEAGENTURER A/S
Skippergaten 22
OSLO.

Onze ref. WJK/vo Uw ref. HT/EC Afd. Acc. Telefoon 522 Datum May 13th, 1968

Dear Sirs,

AMMONIUM NITRATE AFRICA.

We have your letter of the 8th inst. with enclosures and may illustrate the situation in the various way-ports when carrying suchlike commodity on account of which we are not in a position to accept ammonium nitrate to Africa:

Discharge of cargo at Puerto Cabello	- probably on lighters
Guayaquil	- " " "
Curacao	- conveyance of sizable parcels of ammonium nitrate in transit not allowed and cargo most probably to be lightered at Aruba.

Furthermore, vessels carrying more than 50 tons are not permitted to call at Curacao.

Venezuelan way-ports, if any; vessels off quay at 5 p.m., irrespective whether unloaded or not.

In case dockers in NOSA-ports get wind of it that ammonium nitrate is on board, the possibility exists that 60 percent surcharge is demanded in connection with excess risk.

In the circumstances you will understand that there is no interest on our part for subject product so that we gladly leave this cargo to other lines in this traffic.

Yours faithfully,

ROYAL NETHERLANDS STEAMSHIP COMPANY

Dangerous Goods—Declarations

Definition

Dangerous in this document has the same meaning as in the IMCO Code and/or other official regulations which shipowners/shippers are bound to observe.

Preamble

European Shippers' Councils and CENSA agree that, in the majority of cases, shippers (and their agents) provide shipowners with proper declarations in accordance with the provisions of the various national regulations governing the reception, carriage and discharge of dangerous cargoes. Both parties consider that all possible publicity should be given to the requirement that from both the legal and, especially, the safety points of view, proper and clear information should be provided as recommended in the IMCO Dangerous Goods Code. Both parties are also of the opinion that the IMCO Code is sufficient for the declaration of dangerous goods and, in order to facilitate the safe movement of dangerous goods, its international adoption is a matter of extreme importance. Nevertheless, it is recognised that carriers may be bound to observe regulations which differ from the IMCO Code and that, consequently, further information may be required from shippers and/or their authorised representatives. The Conferences concerned, together with the Shippers' Councils involved, will co-operate towards the ultimate abolition of deviations from the IMCO Code where such deviations still prevail. Meanwhile, the European Shippers' Councils recognise that shippers are bound to respect deviating Conference rules which follow logically and inevitably from official requirements. Furthermore, in view of the fact that the IMCO principles do not apply in all countries as yet and that possible adjustments are necessary, the European Shippers' Councils are ready to meet individual Conferences to consider the minimum required deviations from the IMCO Code.

Bearing in mind the volume and variety of dangerous goods which move by sea and the likely increase in the carriage of such goods in future, both parties stress that they are not only concerned with the safe transport of dangerous goods, the safety of crew and vessels concerned, but also with the safety of stevedoring and terminal operations.

Recommendation

With the foregoing in mind and in an endeavour to improve the method of providing shipowners with proper and clear information relating to dangerous goods at the time those goods are offered for shipment, CENSA and European Shippers' Councils jointly recommend the following:—

(1) Consignments of dangerous goods will not be booked for shipment unless the shipper/his authorised representative has provided the shipowner/his agent with an authoritatively signed form of declaration which gives, in addition to the information normally supplied in the case of shipments of general cargo (Marks, No.(s), package(s), description of package(s), weight, etc.), at least the following further information:—

(a) the correct technical name of the goods as stipulated in the IMCO Code (as distinct from the trade name, etc.);

(b) the class and UN-number(s) of the IMCO Dangerous Goods Code, including the dangerous nature and flashpoint, if any, of such goods;

(c) the B/L description of the consignment when required.

(2) In the case of shippers employing forwarding agents at the port of shipment, they should ensure that the necessary information is also passed on to those agents;

(3) In the case of shipments which may require the provision of special protective clothing for those handling the cargo, and/or special first aid and fire prevention measures to be available, shippers should supply shipowners with information on these subjects;

(4) Goods should be clearly marked/labelled in order that the nature of the danger is easy to identify from the package (inflammable, explosive, etc.);

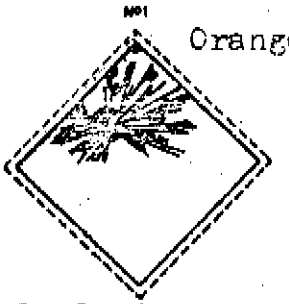
(5) Goods should be packed in a manner adequate to withstand the ordinary risks of handling and transport by sea having regard to the nature of the goods;

(6) In the case of dangerous goods shipped in a container those responsible for the stowage of the goods in the container should certify that the cargo has been properly stowed and secured, and the correct labels affixed to the outside of the container. Incompatible goods should not be packed in the same container.

(7) In the case of shipments of dangerous goods in portable tanks or tank containers, detailed particulars about the construction of the tanks should be provided, if required, in order to facilitate the clearance of such tanks by national authorities.

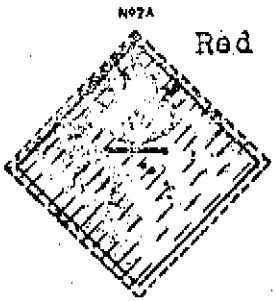
ADR/RID Danger Labels.

APPENDICE A6
ETIQUETTES DE DANGER
(Voir marginal 3902)
Reproduction réduite



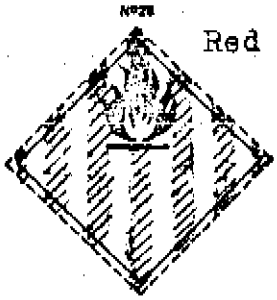
Orange

Explosive



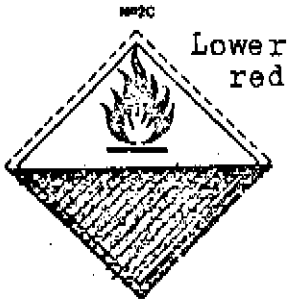
Red

Inflammable liquid



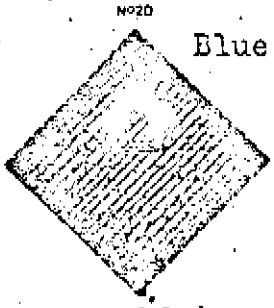
Red stripes

Inflammable solid



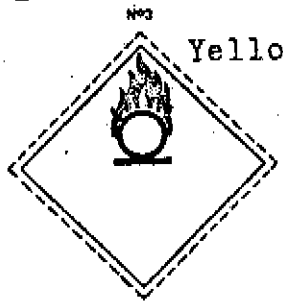
Lower half red

Spontaneously combustable



Blue

Dangerous when wet

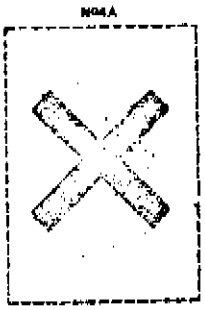


Yellow

Organic peroxide
Oxidizing agent

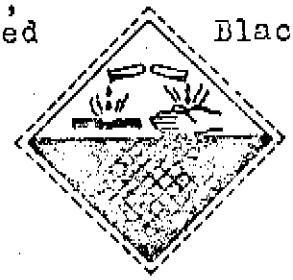
White

Poison
Poison gas



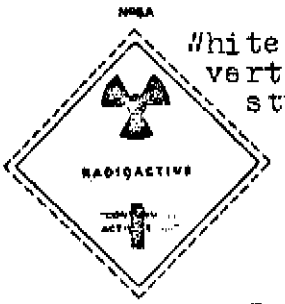
Yellow, unframed

Noxious



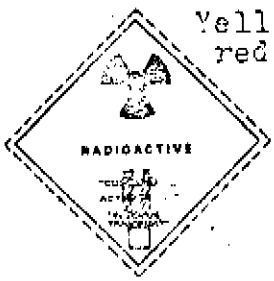
Black and white

Corrosive



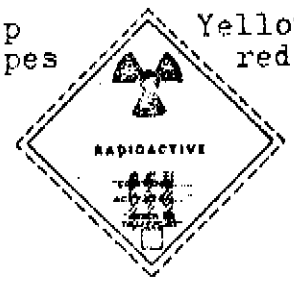
White, red vertical stripe

Radioactive I



Yellow top red stripes

Radioactive II

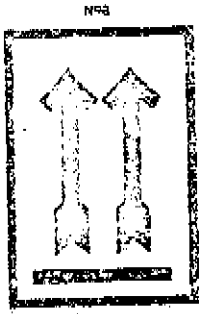


Yellow top red stripes

Radioactive III

White

Keep dry



White

Arrows pointing upwards

White

Not to be tipped over, Handle with care

List of hazard information cards:

HAZARD INFORMATION

No.	Card
01	Dangerous.
02	
03	
04	
05	Irritant.
07	
08	
09	
10	
11	Explosives Class "C."
12	
13	
14	
15	Explosives Class "B."
16	
17	
18	
19	Explosives Class "A."
20	Non-flammable gas.
21	Non-flammable gas—corrosive.
22	Oxygen.
23	Flammable gas.
24	Flammable gas—corrosive.
25	
26	Non-flammable gas—poison.
27	Oxidizer gas—poison.
28	Flammable gas—poison.
29	Flammable gas—poison—extremely hazardous.
30	Combustible or flammable liquid.
31	Flammable liquid—corrosive.
32	Flammable liquid—poison.
33	
34	Combustible or flammable liquid—self-reactive or thermally unstable.
35	Combustible or flammable liquid—corrosive—self-reactive or thermally unstable.
36	Combustible or flammable liquid—poison—self-reactive or thermally unstable.
37	
38	Pyroforic liquid.
39	
40	Flammable solid.
41	Flammable solid—poison.
42	Flammable solid—pyroforic.
43	Flammable solid—pyroforic—poison.
44	Flammable solid—water reactive.
45	Flammable solid—poison—water reactive.
46	Flammable solid—pyroforic—water reactive.
47	Flammable solid—pyroforic—poison—water reactive.
48	
49	
50	Oxidizer.
51	Oxidizer—corrosive.
52	
53	Oxidizer—poison—corrosive.
54	Oxidizer—thermally unstable.
55	Oxidizer—thermally unstable—corrosive.
56	Oxidizer—thermally unstable—poison.
57	Organic peroxide.
58	Organic peroxide — refrigerated, highly sensitive.
59	Organic peroxide—extremely sensitive.
60	Poison—highly toxic.
61	Poison—highly toxic—combustible.
62	Extremely toxic.
63	
64	Extremely or highly toxic by skin absorption.
65	Extremely toxic—flammable or combustible.
66	
67	Extremely or highly toxic by skin absorption, flammable or combustible.
68	
69	
70	Radioactive—low hazard.
71	Radioactive.
72	Radioactive—oxidizer.
73	Radioactive—corrosive.
74	Radioactive—pyroforic.
75	
76	
77	
78	Radioactive—poison—corrosive.
79	Radioactive—plutonium nitrate acid.
80	Corrosive.
81	Corrosive—poison.
82	Corrosive—HOD.[1]
83	Corrosive—combustible.
84	Corrosive—poison—HOD.[1]
85	Corrosive—combustible—poison.
86	Corrosive—combustible—HOD.[1]
87	Corrosive — combustible—poison—HOD.[1]
88	
89	

[1] HOD = Heat of dilution.

OXIDIZER

POISON, SELF REACTIVE OR THERMALLY UNSTABLE

POTENTIAL HAZARDS

Fire	May cause fire and react violently on contact with combustibles. Reaction with fuels may be violent. Heated container may rupture violently and produce flying missiles.
Explosion	Mixture with fuels may explode. Decomposition with explosive violence may be caused by friction, shock, heat or contamination.
Health	Vapor, mist or dust is poisonous, can be fatal if breathed in high concentrations. Contact with material may cause severe burns to skin and eyes. Runoff to sewer may create poison hazard.

IMMEDIATE ACTION INFORMATION

General	No unnecessary personnel. Keep upwind. Identify and isolate hazard area. Wear self-contained breathing apparatus and full protective clothing.
Fire	On small fires, use dry chemical or carbon dioxide. On large fires, use flooding amounts of water. Cool containers with water from maximum distance. Withdraw from hazard area, if fire in cargo area is massive or advanced, and if firefighting is necessary, use unmanned hose or monitor from maximum distance behind barrier. Use water spray to protect surrounding area.
Spill or Leak	Stop leak if without risk. Keep spilled material away from combustibles. Use water spray to reduce vapors. Use noncombustible absorbent material (sand,etc.) to collect small spills. Dilute liquid spill with large amounts of water. Dike for later disposal.
First Aid	Remove to fresh air. Call physician. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Remove contaminated clothing and shoes. In case of contact with material or water solution, immediately flush skin and eyes with running water for at least 15 minutes. Keep patient at rest. Effects of contact or inhalation may be delayed.

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IMMEDIATELY REPORT POLLUTION OR CONTAMINATION TO PROPER AUTHORITIES.

OXIDIZER

SELF REACTIVE, THERMALLY UNSTABLE

POTENTIAL HAZARDS

Fire	May cause fire and react violently on contact with combustibles. Reaction with fuels may be violent. Heated container may rupture violently and produce flying missiles.
Explosion	Mixture with fuels may explode. Decomposition with explosive violence may be caused by friction, shock, heat or contamination. Runoff to sewer may create explosion hazards.
Health	Contact with material may cause severe burns to skin and eyes.

IMMEDIATE ACTION INFORMATION

General	No unnecessary personnel. Keep upwind. Identify and isolate hazard area. Wear fire fighters full protective clothing. Self-contained breathing apparatus should be available.
Fire	On small fires, use dry chemical or carbon dioxide. On large fires, use flooding amounts of water. Cool containers with water from maximum distance. Withdraw from hazard area, if fire in cargo area is massive or advanced, and if firefighting is necessary, use unmanned hose holder or monitor from maximum distance or behind barrier. Use water spray to protect surrounding area.
Spill or Leak	Stop leak if without risk. Keep spilled material away from combustibles. Use noncombustible absorbent material (sand,etc.) to collect small spills. Dilute large liquid spills with large amounts of water, dike for later disposal.
First Aid	Remove contaminated clothing and shoes. In case of contact with material or water solution, immediately flush skin or eyes with running water for at least 15 minutes. Use standard first aid procedures.

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